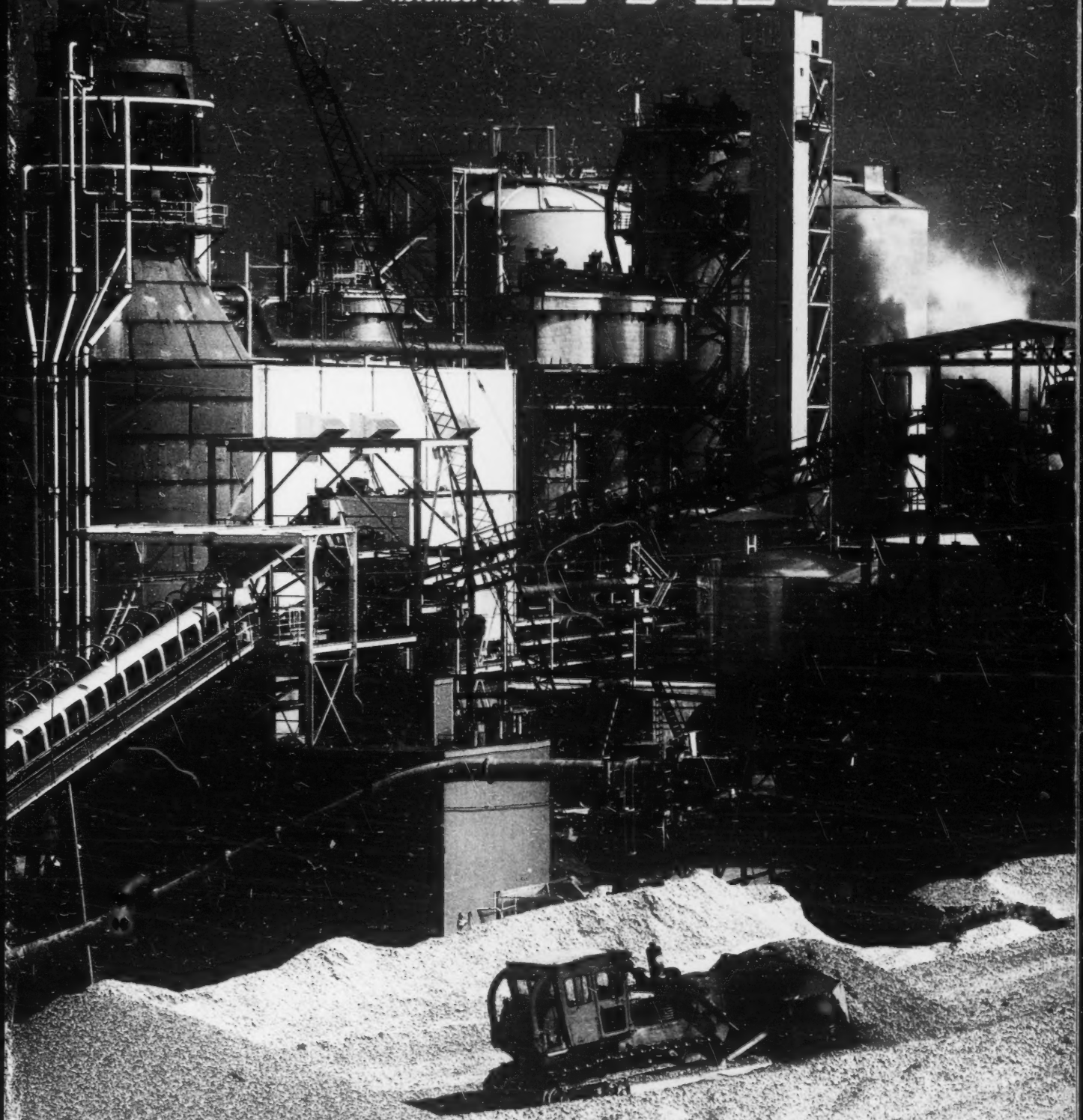
C3475-1

PULP & PAPER

November 1985



PULPING: New benefits from proven technology

INTERVIEW: [illegible] management [illegible]

discusses [illegible] outlook

Volume 59
Number 11

NOVEMBER

FOCUS: PULPING

New pulp washer 65
Pulp filter with compaction baffle and pressurization permits low-level installation, greater efficiency

Opco process update 72
Opco pulp is used to replace chemical pulp in a groundwood newsprint furnish at Q.N.S. Paper Co.

Batch pulping trends 86
Recent developments, extended delignification techniques have renewed interest in batch pulping

Cold-blow batch digesters 90
New technology can make batch pulping as energy efficient as continuous systems

Nozzle plugging eliminated 98

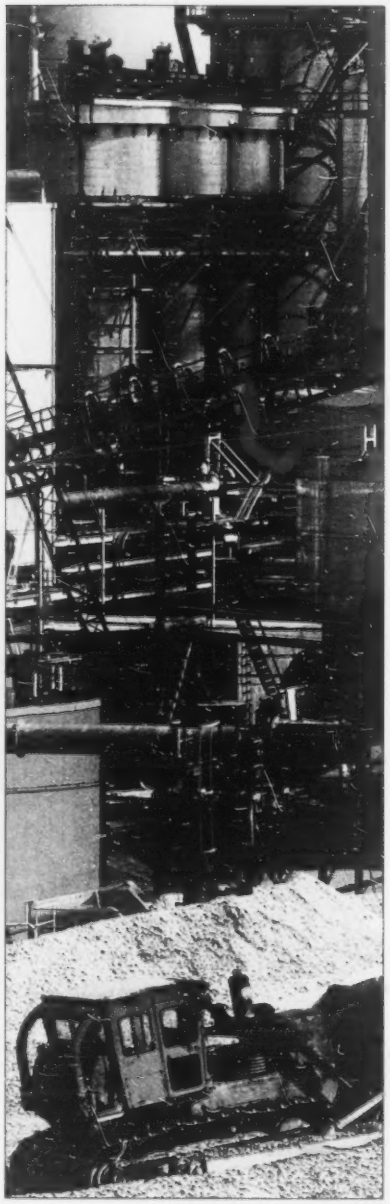
Mechanical disintegrator helps unclog recovery boiler spray nozzles at Louisiana-Pacific

Pulp quality control 103
Statistical methods were used to study pulp K number variations caused by changing chip quality

Kraft recovery reactions 122
Burning spent liquor in a kraft recovery boiler involves reactions that are often not fully understood

Sulfite liquor recovery 132
Cross-recovery of spent bisulfite liquor has reduced effluent BOD at Great Lakes Forest Products

Peroxide boosts brightness 147
Consolidated Papers uses peroxide addition to high-density storage as final stage of a four-stage sequence



THE COVER

Champion International's pulp mill at Courtland, Ala. (Photo by Harald Sund, courtesy of Champion International.)

OTHER FEATURES

PROCESS AUTOMATION

Optical fiber length analysis 69
Results can be obtained in minutes, results correlate with Bauer McNett and microscopic methods

MANAGEMENT

Paper Chase 3 run 74
Frank Sutman of Great Northern Paper won the 5K race in Atlanta

Wastepaper demand 100
Wastepaper consumption is rising in Europe, but U.S. imports aren't expected to play much of a part

Champion ready for future 113
Interview series: With the St. Regis merger complete, Champion is positioned to be the premier printing/writing papers producer

ENGINEERING/MAINTENANCE

Mill optimization 83
Top Bowater engineers advocate goal setting, teamwork, and good reporting to optimize mill operations

AIR/WATER QUALITY

New sludge thickener 138
European design features thickener before screw press, produces 50% solids on variety of sludges

PAPERMAKING

Bacteria in food board 119
Routine testing and application of proper biocides are the keys to control

Dryer fabric design 142
Dryer fabrics can enjoy long life, but they must be cleaned frequently and designed to maintain permeability

PULP&PAPER

EDITORIAL STAFF

Editor	Ken L. Patrick	AT
Executive Editor	Kenneth E. Smith	AT
Executive News Editor	Willard E. Mies	SF
Senior Editor	John C.W. Evans	NY
Associate Editor	Dave R. Allan	NY
Engineering Editor	Matt Coleman	AT
Senior News Editor	Debra A. Adams	NY
Technical Editor	Michael J. Ducey	SF
News Editor	Carl P. Espe	SF
News Editor	Ted Blackman	SF
Consulting Editor	Stephanie Pollitzer	SF
Departments Editor	Elizabeth A. Smith	AT
Staff Editor	Maude Conrad	SF
Editorial Assistant	Suzanne Wright	AT
International Editors	John Kalish	BR
	John Pearson	BR
	Hugh O'Brian	BR
Managing Editor	Paula J. Irons	SF
Art Director	Ellen Zaslow	SF
Copy/Production Editor	Deborah S. Sollosi	SF
Copy/Production Editor	Regina M. McGrath	SF
Technical Artist	Janet Duncan	SF

Office locations

AT = Atlanta: 2700 Cumberland Parkway N.W., Suite 530, Atlanta, Ga. 30339; (404) 432-3186
SF = San Francisco: 500 Howard St., San Francisco, Calif. 94105; (415) 397-1881; Telex 278273
NY = New York: 370 Lexington Ave., New York, N.Y. 10017; (212) 683-9294; Telex 220442
BR = Brussels: Chaussée de Charleroi 123a, Boite 5, B-1060, Brussels, Belgium; Telex 846-24672

PUBLISHING HEADQUARTERS
San Francisco, California

Publishing Director	Leigh M. Freeman
Group Publisher	Leonard E. Haas
Director of Productio..	Andrew A. Mickus
Director of Circulation	Wini D. Ragus
Ad Production Coordinator	Mary Marrkand
Marketing Coordinator	Dana Baker
Statistical Assistant	Kimberly M. Johnson

Sales and business offices are listed on Advertisers' Index page

MILLER FREEMAN publications

Chairman of the Board ..... David R. Stevens
President ..... Marshall W. Freeman
Vice President ..... Charles C. Baake
Vice President ..... Leigh M. Freeman
Vice President ..... Leonard E. Haas
Vice President ..... Barbara M. Hampson
Vice President ..... Thomas L. Kemp
Vice President ..... Wini D. Ragus
Secretary/Treasurer ..... Miller Freeman III
Assistant Treasurer ..... Douglas M. Denny

PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.
POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

© Copyright 1985 by Miller Freeman Publications Inc. All rights reserved.

ABP VBPA

Subscriptions & Address Change: Sent without charge in the U.S.A. & Canada (upon written request) to individuals in pulp, paper, and board manufacturing firms and paper converting firms. To all others there is a subscription charge of $45.00 a year in the U.S. All subscriptions to other countries: $65.00 a year, except Europe and Mediterranean, $75.00 (air service included). Single copy, $4.00, except Buyers Guide, $25.00. Photocopies of articles and complete microform volumes available through University Microfilms International, 300 N. Zeeb Rd., Ann Arbor, Mich. 48106.

Requests, subscription orders, and address changes must show name and position or job of individual, name and location of mill, plant or office where employed, and exact business or product produced at this location.

Send subscription correspondence to:
Circulation Department, PULP & PAPER,
500 Howard St., San Francisco, Calif. 94105.
For address change, include label from recent issue.

NOVEMBER

COLUMNS

From the Editors 7
by Kenneth E. Smith
Nice guys finish first

Business Outlook 41
by Fred G. Robertson
Pulp market—wait until 1987 for real upturn

Career Development 157
by Roberta Bhasin
How to break the "snowed under" cycle

Chemical Report 43
by Michael Ducey
Kraft pulping: More specialties hit the market

Automation Update 164
by Ole Fadum
A new symbol for millwide automation

Comment 226
by Jaak Puusepp
Lumber battlefield: a Canadian view

DEPARTMENTS

Conference Calendar 45
News of People 159
Product Showcase 171
New Products 181
Product Review 195
Literature 201
Bookshelf 209
Finishing/Converting 211
Supplier News 212

SERVICES

Company Index 167
Reader Service Index 169
Reader Service Card 177
Professional Service Directory 214
Classified Advertising 217
Advertisers Index 224

NEWS

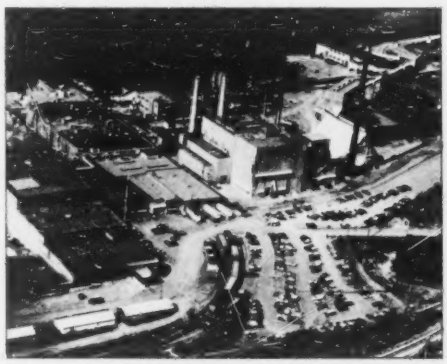
Month in Statistics 9
U.S. paper and paperboard production data for August

Market Report 11
Supply pressure on world pulp prices
$30/ton price hike for liner falters
Grocery paper prices may rise again

Grade Profile 13
Unbleached kraft paper: Withdrawals should keep operating rates high

NEWS SCAN

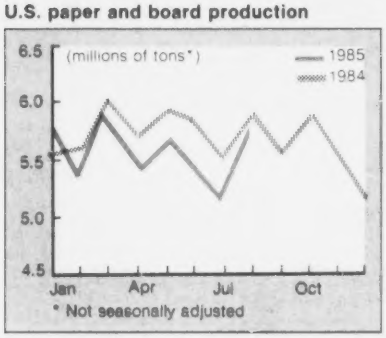
Stone to buy Champion units 21
Beloit studies restructuring 21
Smurfit to expand liner mill 23
Con-Bath to install new TMP mill 23
Donohue's financing hits snag 23
CIP plans SC expansion 25
Pensacola to get new oxygen lines 25
Makin clears site for mill 25
Quebecor plans newsprint mill 25
U.S. papermakers to up spending 27
Ratings fall for paper companies 27
No UPIU for Leaf River employees 27



Maine okays GN's "Big A" 29
BCFP's Crofton mill installs boiler 29
Blandin postpones LWC unit 29
Manville to buy Inland's plants 31
Clevepak to sell plants to workers 33
PCA starts up high-tech unit 33
P&G cuts some tissue prices 33
Pacific Lumber rejects buyout 35
Southern softwood shortfall seen 35
L-P settles redwood park issue 37

International News 39
Pulp leads Chilean forest exports
Brazil contemplates new expansions
Study sees Scottish mill competing
Finnish firm considers U.K. mill site

U.S. paper and board production



U.S. production of paper and paperboard totaled 5.8 million tons in August, down 0.8% from August 1984, according to American Paper Institute figures. The two-month moving average of seasonally adjusted data showed paper and board production through August at an annual rate of 67.3 million tons, 2.9% lower than last year. Paper continues to make the strongest showing, with a trend rate in August of 34.2 million tons, down 1.6% from 1984. The trend rate for paperboard stood at 33.2 million tons, down 4.2% from last year.

Among major grades, only tissue and uncoated free sheet exceeded last year's mark, rising an annualized 2.1% and 4.0% in August, respectively. Packaging and industrial papers were off 9.1% from last year, while uncoated groundwood fell 8.6%. Kraft paperboard dipped 6.1% in August, with production for export down 23.8%. Corrugated box shipments were down 2.9% compared to 1984, the Fibre Box Assn. reported.

Canadian newsprint shipments declined 1.3% in August to 742,000 metric tons, the Canadian Pulp & Paper Assn. said. Operating rates for the month stood at 94%. Pulp shipments for the month dropped 5.2%, while operating rates climbed to 90%. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	Aug.	456	−3.0	5,484	−1.8
Uncoated groundwood (s)	Aug.	132	11.9	1,464	−8.6
Coated paper (s)	Aug.	492	−6.8	6,049	−3.1
Uncoated free sheet (s)	Aug.	840	12.1	9,672	4.0
Other printing/writing	Aug.	111	−5.9	1,338	−9.1
Total packaging and other paper (s)	Aug.	441	−8.3	5,200	−9.3
Tissue	Aug.	427	−1.2	4,949	2.1
Total paper	**Aug.**	**2,899**	**−0.1**	**34,156**	**−1.6**
Unbleached kraft paperboard	Aug.	1,413	−7.6	16,430	−6.1
Semichemical medium	Aug.	460	2.4	5,072	−3.1
Bleached paperboard	Aug.	352	—	3,992	−3.0
Recycled paperboard	Aug.	672	4.8	7,674	−1.9
Total paperboard	**Aug.**	**2,897**	**−0.8**	**33,168**	**−4.2**
Total U.S. paper and paperboard output	**Aug.**	**5,796**	**−1.4**	**67,323**	**−2.9**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	July	4,499	−0.6	54,306	−2.6
Market pulp production	July	591	3.7	6,927	1.5
Wastepaper consumption at paper/board mills	July	1,212	−0.6	15,157	−4.6
Pulpwood consumption (cords)	July	7,022	−2.4	86,109	−2.2
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	Aug.	23.167	−2.5	178.605[6]	−0.8
Containerboard inventories at U.S. box plants and mills	Aug. 1	2,820	−0.6		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	July	880	−10.8	11,074	5.5
Imports of Canadian newsprint	July	637	−8.3	9,477[6]	26.8
U.S. paper exports (including products)	July	311	−16.2	3,961	−11.5
Exports of unbleached kraft linerboard	Aug.	164	−23.7	1,728	−23.8
Exports of woodpulp	July	334	19.7	3,883	6.8
Norscan pulp inventories[4]	Aug. 31	1,552	2.6		
Norscan pulp operating rates[4]	Aug.	87%	87%	91%	86%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	Aug.	742	−1.3	5,956[6]	—
Operating rates	Aug.	94%	94%	92%	91%
Inventories held by U.S. consumers	Aug. 31	1,553	2.3		
Other paper/board shipments	Aug.	258	6.2	1,997	8.7
Woodpulp shipments (export only)	Aug.	583	−5.2	4,622[6]	6.0
Operating rates	Aug.	90%	97%	89%	91%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = shipments.

UNBLEACHED KRAFT PAPER: Withdrawals should keep operating rates high

Grade structure: Unbleached kraft paper (UKP) is normally divided into four end uses: wrapping, bag and sack, shipping sack, and other converting. Bag and sack paper is the largest category, accounting for about 59% of total shipments, followed by multiwall shipping, 24%; other converting, 14%; and wrapping, 3%.

Basis weights for bag and sack paper range from 30 lb to 80 lb/3,000 ft², with the lower basis weights used for small grocery and merchandise bags and 70 lb most commonly used for grocery carryout sacks. Multiwall shipping sack paper is 50 lb or 60 lb. Extensible or air-dried paper may be used for bags requiring strength and toughness.

Production/capacity: UKP shipments remained flat in 1984 at 3.7 million tons but so far this year have been running about 10% below a year ago. The decline in 1985 shipments reflects weak demand in many end uses and the shutdown of four paper machines over the past year. Georgia-Pacific Corp. idled or converted two machines at its Crossett, Ark., mill during 1984-85 with a combined capacity of 157,000 tpy. International Paper Co. this summer converted a 135,000-tpy unbleached machine at its Mobile, Ala., mill to white paper production. Champion International Corp. in July shut down a 110,000-tpy machine at its Pensacola, Fla., mill.

Grocery bag and sack paper shipments this year have shown a smaller-than-average decline. Large carryout sacks continue to withstand competition from plastic T-shirt bags, which have now captured roughly 10% of the U.S. market. Multiwall paper demand, however, has declined more sharply due to depressed demand for sacks to ship fertilizer and other agricultural supplies. Other converting and wrapping grades have shown fairly large declines, partly due to competition from plastics.

Outlook: UKP shipments are expected to decline at a roughly 5%/year average rate over the next several years, reflecting further machine shutdowns or conversions. The capacity withdrawals, however, should keep kraft paper operating rates relatively high.

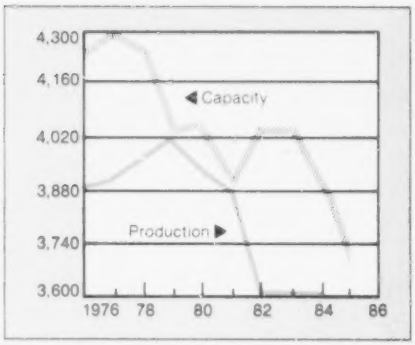
G-P plans to rebuild a 158,000-tpy swing machine at its Monticello, Miss., mill later this year. The machine at first will continue to produce some kraft paper but is expected to shift more to linerboard once market conditions improve. Champion plans to convert the 236,000-tpy air-dried (Stress Kraft) paper machine at its Pensacola, Fla., mill to white paper in 1987. This loss of capacity will be partly offset by a planned 90,000-tpy expansion of the firm's Roanoke Rapids, N.C., mill.

The American Paper Institute's last capacity survey showed 3.95 million tons of UKP capacity at the end of 1984, dropping 240,000 tons to 3.71 million by the end of 1987. Adjusted for recent withdrawal announcements, capacity may drop about 600,000 tons over this period to around 3.3 million tons by the end of 1987.

Pricing: UKP pricing has been under pressure since the fall of 1984 due to soft demand for some types of bags and sacks and the availability of low-priced spot tonnage from swing linerboard machines. Prices for 70-lb grocery sack paper reached as low as $260/ton this summer, but a recent $30/ton price increase around Sept. 1 appears to have been successful, and at least one producer has announced an additional hike for November. However, the second increase may be more difficult to achieve until linerboard prices begin to firm. A $30/ton price hike was announced on shipping sack paper for Oct. 1.

Year-end price history for 70-lb grocery sack paper is as follows: 1978, $240; 1979, $260; 1980, $280; 1981, $300; 1982, $240; 1983, $380; 1984, $330; 1985 (mid-year), $260. Multiwall sack paper (50 lb): 1978, $305; 1979, $340; 1980, $375; 1981, $405; 1982, $360; 1983, $380/$410; 1984, $390; 1985 (mid-year), $375 (with discounting).

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

	1983	1984	1985e
Shipments[1]	3,666	3,666	3,280
Capacity[1]	4,065	3,954	3,704[2]
Utilization rate	90.2%	92.7%	88.5%
Imports	23	43	40
Exports	116	107	73
Apparent U.S. consumption	3,573	3,602	3,247
lb/capita	30.5	30.7	27.6
GNP ratio	2.33	2.20	1.92

1. American Paper Institute
2. Excludes 110,000-tpy Champion International Corp. machine shut down in mid-1985
3. Dept. of Commerce

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity	Market share (%)
1. Stone Container	645	17.4
2. Georgia-Pacific	500	13.5
3. Champion Intl.	430	11.6
4. Union Camp	415	11.2
5. Longview Fibre	320	8.6
6. International Paper	260	7.0
7. Gilman Paper	205	5.5
8. Westvaco	150	4.0
9. Chesapeake	115	3.1
10. Weyerhaeuser	110	3.0

Market share of top five companies:
62.4%

Market share of top ten companies:
85.0%

Total U.S. capacity (1985):
3,704 million short tons

KRAFT PULPING: More specialties hit the market

Cooking. Makeup kraft chemicals have traditionally been needed for balancing sodium and sulfur in the kraft recovery process and for replacing calcium losses in the causticizing cycle. Saltcake, purchased in dry form, or spent acid from chlorine dioxide generation are added to concentrated black liquor at the recovery boiler. As a result, sodium and sulfur lost out of the recovery furnace stack and washed out before, during, and after bleaching are replaced.

Some deviations from commonly used chemicals and newer and more efficient specialties are appearing more frequently in U.S. and Canadian pulp mills. Saltcake is being substituted by emulsified sulfur, caustic, and soda ash for economical and operational advantages. One of these gains is adjusting sulfidity to attain a more selective cooking liquor for higher yield and improved pulp strength. A sulfur slurry can be added to black or white liquor and converted to sodium sulfide by dissolution and evaporation. Caustic addition would be utilized for sodium, requiring less water and, subsequently, less evaporator steam and heat loss during furnace operations. Lower sulfidity could reduceevaporator scale and strengthen white liquor, among other benefits.

Soda ash could replace caustic as the sodium source, but with prices firming it is not likely to catch on quickly unless the trend toward tightening caustic supply (due to declining production of its coproduct, chlorine) becomes significant enough for a large price increase. Use of excess spent acid from chemical generation may soon have to be curtailed if government regulations continue to strive for zero effluent loads. This would push mills to purchase chlorine-dioxide-generating equipment with tighter recycling processes, which would increase the demand for supplied chemicals.

Pulp additives have been popular of late. Anthraquinone is a proven yield and strength enhancer, but high costs are depressing its use. Demand is growing for processing aids such as defoamers, slimicides, and washing aids because of their moderate price and efficiency in maintaining operational stability and pulp uniformity. Companies are supplying customized products in most cases. A number of Canadian manufacturers are using talc as a pitch dispersant aid; typical additions range from 2 to 7 lb/ton. Growth in demand for these chemicals will continue as more inferior wood is processed and mill system closure becomes common.

Recovery. Lime, limestone, and pebbled lime are all employed as a source for replacing lost calcium in the causticizing portion of kraft recovery. Fuel oil or natural gas are also used to fire the lime kiln, where heat is required to evaporate water and drive carbon dioxide off calcium carbonate to form calcium oxide. Calcium oxide—regenerated and makeup—is slaked to form calcium hydroxide, which is mixed with the dissolved smelt from the recovery furnace and eventually forms the cooking liquor. Lime demand by the pulping industry follows production patterns, and increases are mainly coming from wastewater treatment areas. Price is mostly influenced by the steel industry and has climbed incrementally to double its value of ten years ago. Larger amounts of lime will be needed if mills adjust sulfidity levels and elemental sulfur is used.

Innovative methods of improving lime kiln performance have been well received by the industry. Fluidized bed calciners, installed in a few mills, offer benefits in reduced fuel load, particulate emissions, and space and maintenance requirements, but they are more costly to purchase and operate than the common rotary kiln. Oxygen enrichment is helping mills to increase capacity in kilns—a typical mill bottleneck area. ■

TABLE 1: **U.S. demand for kraft chemicals (short tons).**

Chemical	Kraft pulping	All pulp & paper	All industry	Price
Saltcake	460,000	490,000	1,060,000	$65/ton[1]
Caustic	300,000	1,785,000	10,200,000	$175/ton[2]
Lime	575,000	1,000,000	16,100,000	$78/ton[3]
Defoamers	16,250	23,250	—	$0.80–$1.15/lb

1. Bulk purchase, 100% basis, f.o.b. works, East Coast. West Coast price add $10.
2. 50% solution, Gulf Coast works, freight equalized.
3. Quicklime, bulk f.o.b. plants.

TABLE 2: **Canadian demand for kraft chemicals (metric tons).**

Chemical	Kraft pulping	All pulp & paper	All industry	Price[1]
Saltcake	315,000	333,000	420,000	$65/ton
Caustic	246,000	990,000	1,638,500	$395/ton[2]
Lime	270,000	285,000	2,000,000	$62/ton[3]
Defoamers	10,395	15,100	—	$1.15–$1.25/lb

1. All prices are in Canadian dollars and represent list prices.
2. 50% solution, f.o.b. works, freight equalized.
3. Quicklime, f.o.b. Ontario producing points.

Europe's wastepaper demand is not too promising for U.S. exporters

European mills are expected to increase their consumption of secondary fiber but will probably not be importing much U.S. wastepaper

By DEBRA A. ADAMS, Senior News Editor

■ Wastepaper consumption in Europe is on the upswing. Its paper industry expects modest long-term growth with dramatic increases in secondary fiber use. Yet European mills probably will not have to buy any significant amount of paper stock from the outside and are not likely to go as far as the U.S. to meet any deficits.

Europe's demand for wastepaper is expected to grow at a more rapid rate between 1985 and 1990 than it did between 1980 and 1985, the Organization for Economic Cooperation & Development (OECD) reports. Yet demand for U.S. wastepaper is not likely to increase by a significant amount for at least the next five years, observers indicate.

While opportunities will open up in Europe, U.S. paper stock dealers will have better markets in such areas as the Far East and Mexico, where significant growth in wastepaper demand is expected. In addition, it is forecast that the European wastepaper sector will be able to adequately supply its own future requirements from within its borders. And what it can't get from inside will probably be obtained from countries with more favorable exchange rates than that of the U.S.

The dollar has hurt U.S. exports to Europe (and to other countries) a great deal in the past few years. But that is not the only reason behind the substantial decline in European demand for U.S. secondary fiber. Europe has also become more self-sufficient in the past few years and has alleviated shortages with imports from such countries as the U.S.S.R.

Demand from the U.S., however, remains strong from such countries as Spain, Italy, and Austria, according to David E. Stansfield, president of the Paper Stock Div. of the Bureau International de la Récupération (BIR). In 1984, U.S. paper stock exports to Spain jumped ahead of those to Italy. Spain had a 58% increase in its imports of U.S. secondary fiber to 95,178 tons, making it the seventh largest foreign consumer of U.S. wastepaper.

RECORD EUROPEAN CONSUMPTION. Last year was a record year for European wastepaper consumption, with a rise in nearly every country, including Denmark (23%), Fed. Rep. Germany (14.1%), the U.K., (9.6%), France (8.5%), Netherlands (8.0%), Italy (7.4%), and Belgium (3.0%). Overall, Europe used 10.9% more wastepaper than it had in 1983, according to the European Confederation of Pulp, Paper & Board Industries (CEPAC). U.S. paper stock exports to western Europe alone increased by more than 60% in 1984.

Wastepaper currently comprises about 45% of the fibrous materials used by the European paper and paperboard industry. Europe is a large user of recycled paper with an apparent annual consumption of 12.8 million metric tons and a recovery rate of 31%. This compares with an apparent consumption of 14 million metric tons and a recovery rate of 26% in the U.S.

TABLE 1: **Papermaking materials—Europe uses less chemical pulp than the U.S.**

Fiber	U.S. (%)	Europe (%)	Fed. Rep. Germany (%)
Pulp			
Chemical	60	35	30
Mechanical	10	15	15
Wastepaper	25	30	40
Minerals, etc.	5	10	15
Total	**100**	**100**	**100**

Source: European Paper Institute

TABLE 2: **Demand for wastepaper from the European pulp and paper industry.**

Country	1983	1984	1985	1990
Fed. Rep. Germany	103	—	—	—
Austria	114	124	127	151
Spain	116	119	123	—
Finland	104	99	101	125
France	101	116	121	141
Portugal	126	137	151	184
Sweden	101	112	118	125
Switzerland	109	113	116	125

Source: Organization for Economic Cooperation & Development
Index: 1980 = 100.

Europe is currently a small net importer of wastepaper, unlike the U.S., which is a significant exporter. In terms of papermaking materials, Europe uses significantly more minerals, recyclable paper, and mechanical pulp than does the U.S. It uses much less chemical pulp. A comparison of Fed. Rep. Germany and the U.S. alone shows even more pronounced differences (Table 1).

One of the reasons Europe's consumption of secondary fiber is expected to increase in the next few years is the projected rises in paper and board production and lower supplies of other raw materials (Table 2). In addition, technology has increased the industry's ability to incorporate paper stock into its papermaking systems. In fact, better technology has made it possible to downgrade the type of paper stock used. According to an OECD report, newer machines are "eliminating every kind of contaminant, lowering energy costs for processing, and improving recycled fibers."

CORRUGATED REMAINS BIG ITEM. Europe's demand for wastepaper in the future is likely to be mainly in the corrugated and pulp substitute grades, both of which are often in low supply. The greatest tonnage by far will be in corrugated.

Fred Rose, secretary to the Wastepaper and Forestry Committees of CEPAC, expects European demand for pure kraft grades from the U.S., as well as from other countries, to continue. Waste derived from corrugated containers in Europe tends to be of poorer quality than that in the U.S. because Europe's containerboard is made from a higher percentage of wastepaper—the standard being 62% wastepaper vs 38% pure kraft, said Rose.

In addition to the high-kraft recycled grades, Europe will also continue to import pulp substitutes, which are scarce in Europe, but probably at a lower rate than the kraft grades, he said (Table 3).

Jorg Sudan, managing director of Bundesverband Papierrohstoffe E.V. and former president of BIR's Paper Stock Div., feels that Europe will remain a substantial consumer of corrugated, although its growing tissue industry and the need for higher-quality boxboard for more luxury retail goods are likely to put a greater demand than before on pulp substitute supplies.

Stansfield agreed that most European countries, with the exception of Scandinavia, have a deficit of pulp substitutes and the cardboard grades. "The deficit will continue," Stansfield noted at a National Assn. of Recycling Industries convention in May. "There is practically no additional potential for these grades in the printing and converting areas, and only a small potential may be available in the administration sector," he noted.

OECD reports that while demand for pulp substitutes will continue to rise, their availability in Europe will decline. Although these high grades should show the most dramatic rise in demand, the bulk of recyclable paper consumed in Europe will be in the low grades, with Italy and Spain being among the chief importing countries.

IMPROVEMENTS IN TECHNOLOGY. "We feel wastepaper demand will grow modestly with the improvement in deinking systems, resulting in more wastepaper being substituted for pulp," said a Belgian paper stock dealer. "Even now they are trying to collect more wastepaper in such areas as Scandinavia."

Yet Switzerland, Norway, and Sweden all anticipate lower growth in collections between 1985 and 1990. Austria, Canada, and the U.S. expect the opposite, according to the OECD (Table 4). This slow growth is expected to affect markets for such grades as ledgers, newspapers, and printed papers. Demand for mixed papers, meanwhile, has been increasing while the market for duplex board has declined.

Up to 1980, the European Economic Community

Observers expect Europe's future wastepaper demand will be concentrated in corrugated and pulp substitute grades.

TABLE 3: **European pulp and paper industry demand for wastepaper by grade.**

Country	Year	Grades* (%) I	II	III	IV
Fed. Rep. Germany	1980	14	37	11	38
	1983	15	37	12	36
Austria	1980	21	15	8	56
	1985	23	19	9	49
	1990	22	10	9	49
Spain	1980	18	57	3	22
Finland	1980	58	42	n.a.	n.a.
France	1980	11	58	8	23
Norway	1980	17	52	18	13
	1985	15	65	12	8
	1990	18	61	14	7
Sweden	1980	44	43	4	9
	1985	49	38	6	7
	1990	49	38	6	7
Switzerland	1980	53	36	6	5
	1985	54	34	7	5
	1990	54	32	9	5

*Grades: I = Old newspapers; II = Corrugated board; III = High grades; IV = Mixed wastepaper.
n.a. = Not available.
Source: Organization for Economic Cooperation & Development.

(EEC) as a whole needed to import vast amounts of wastepaper to meet its requirements. That changed in 1981. The market balanced out, even showing a surplus of paper stock. The OECD expects that with the exception of spotty fluctuations that may occur in the market, the EEC should be able to meet its future demand for paper stock without importing substantially.

Greece, Italy, Spain, and Austria are exceptions, however, notes the OECD. Italy's deficit of paper stock continues to widen and is expected to lead to a rise in wastepaper imports. Presently Italy imports 25% of its secondary fiber requirements. Spain's rate is 18%. In Austria the deficit is over 50%, but that country is expected to step up its rate of wastepaper recovery between 1985 and 1990, according to the OECD.

Although Europe is a net importer overall, some countries have become net exporters, as noted above. Recovery rates have steadily risen in many areas and have reached rates as high as 45% in the Netherlands. The northern sections have been especially adept at increasing collections, enabling them to export their surpluses, with some of it going to the southern areas. As a result, the U.S. market share in Europe has shrunk.

REGIONAL COLLECTIONS. "Wastepaper moves from North to South," said Patrick Guillanton of FCR, a large French wastepaper merchant. Collections are better in Belgium, Fed. Rep. Germany, and the Netherlands, while supplies are lowest in Italy and Spain.

Greece, Austria, Spain, Italy, and Portugal continue to be net importers of wastepaper while Belgium, Denmark, the Netherlands, U.K., and Switzerland have long been net exporters. In recent years, due to increased collections, Fed. Rep. Germany and France have also become net exporters. Fed. Rep. Germany improved its situation between 1975 and 1980. Scandinavia, on the other hand, has become a net importer as its consumption has risen in recent years while its recovery rate has not kept pace.

Exports from the U.K. were up 21.3% last year over 1983, while increases in exports were also posted in Sweden (41.9%), Fed. Rep. Germany (38.8%), France (18.2%), Belgium (16.5%), and Switzerland (15.2%). Imports rose in the U.K. (32.7%), France (27.4%), Fed. Rep. Germany (27.2%), Switzerland (27.1%), and Sweden (7.9%).

Though advanced, Europe's wastepaper market is still plagued with problems. As in the U.S., it suffers from sudden and drastic swings, resulting in extreme supply and demand imbalances. During shortages, countries seek outside sources of paper stock until the domestic market can expand to meet the rise in demand. At other times, prices are dropped so drastically that supplies dip dangerously low and a sudden pickup usually causes havoc.

The wastepaper market in Europe since mid-1984 had become more and more "overheated," according to one industry report. This was due to collections not being able to keep up with a sharp rise in demand. A temporary shortage developed, causing a sudden rise in prices primarily for "newspapers, waste corrugated board, and mixed wastepaper." The market regained its equilibrium toward the end of the year. Prices leveled off and then started dropping early in 1985 as demand also fell, reports indicate.

In some cases, though, countries continue to import and export even when domestic supplies would otherwise be adequate, causing imbalances in the marketplace. As recently as May, the U.K. was reported to be importing well over 50% of its paper stock needs and exporting a proportionate amount. Poland was one source for imports, and trade with France was also reported. Last year was a record year in the U.K., yet this year is expected to put even more pressure on the wastepaper stream.

One paper stock dealer in Belgium indicated that there is competition among some countries, but basically the market is confined to Europe. "In Brussels we have some competition from Holland, and in south Belgium from France. But most mills stay in their own countries when looking for fiber," said a representative from N.V. Oud Papier, Oostmalle, Belgium, which collects an average of more than 17,500 short tons of wastepaper per month.

PROBLEMS WITH RISING DEMAND. Rose noted other problems with the rise in European demand. Although he projects modest growth in wastepaper consumption in Europe over the next few years, he feels the elasticity in the supply/demand situation will diminish. With a fairly high recovery rate overall in Europe currently, the paper still to be collected has a higher rate of contamination, he noted.

David A. Clark, executive director of the European Paper Institute, stated that while Europe has excelled in its wastepaper collections—reaching the high rate of 30% of paper consumption overall—further rises in that level can give problems with paper quality and collection costs.

"I think the paper industry will be forced to look for ways to modernize its potential to get more paper. It will require exploring new techniques for collection, resulting in greater involvement of the paper industry itself," said Rose, noting that changes in the supply side are likely to appear in the next several years.

Europe's wastepaper industry has some inherent problems as well, dating

(Continued on p. 107)

TABLE 4: **Theoretical availability and expected collection (000 metric tons).**

Country	1980	1983	1984	1985	1990
Theoretical availability					
Austria	350	400	420	450	625
Finland	578	637	656	676	720
Norway	420	415	425	430	460
United Kingdom	5,771	5,934	6,082	6,198	—
Sweden	1,415	1,410	1,430	1,450	1,510
Switzerland	1,110	1,050	1,100	1,100	1,200
Expected collection					
Austria	263	300	310	325	490
Finland	244	268	300	315	360
France	1,891	2,155	2,220	2,400	—
Norway	116	110	125	135	150
Sweden	576	630	645	660	695
Switzerland	550	580	590	600	650

Source: Organization for Economic Cooperation & Development.

cooking conditions. Yet statistics indicate that this is perfectly normal within the system since this increase is only slightly more than one standard deviation from the average three-term chip moisture range. The moisture contribution to the liquor/wood ratio for these two times may be calculated from the bulk density, percent moisture, production rate, and feeder volume. The results indicate an increase in the liquor/wood ratio of 3.1 to 3.6, hardly enough to make an impact.

In all likelihood, this variation is attributable to a parameter that is difficult to quantify: chip age. During the Feb. 18 sampling period, a marked change occurred in the chip furnish appearance and in its odor. An investigation revealed that the hardwood chip storage pile was being lowered, and older chips near the bottom were being sent to the Kamyr digester. Figure 2-D shows the difference in chip appearance between 3:00 p.m. and 4:00 p.m. A detailed analysis of chip aging characteristics has recently been reported by Fuller.[2]

During the study, a long-standing contention of the operators was documented, i.e., old chips plug the digester extraction screens and produce soft cooks. The pattern that old chips display in the Kamyr's performance is similar to that displayed by large amounts of pin chips passing through the system. It is conjectured that old chips tend to fractionate more easily into pin chips as a result of the mechanical action experienced in the various feeders, screw conveyors, and separators. Most likely the older chips had been damaged by either fungal decay or compaction during storage, or both. Fungal decay may be tested by the wood's increased solubility in hot 1% sodium hydroxide solution. A review of texts on chip testing procedures did not reveal any method for determining compaction damage on chips.

CHART FOR MAR. 8, 1985. Figure 3-A shows the statistical chart plotted by the Kamyr digester operator for Mar. 8. The sample period overlaps one out-of-control point on the R chart at noon. An abnormal jump in K number occurred, from 9.4 to 12.3, as shown in Figure 3-B—a plot of hourly K numbers and the weight fractions of oversize chips. At 8:00 a.m. the amount of oversize chips was 15.9%, more than three standard deviations above the baseline average. The cook became harder because liquor and heat penetration were slower due to the increased proportion of larger chips.

This study revealed that short-term fluctuations in chip quality adversely affected K numbers for 8% of total operating time. Experience indicates this figure may actually be as much as 10% to 15%. Presently, the study has drawn attention to the desirability of maintaining uniform chip composition to the digester. A follow-up study has been initiated to find a cost-effective way to eliminate chip quality disturbances on the Kamyr. ■

REFERENCES

1. Kenneth E. Smith, "Statistical Controls Improve Quality, Boost Productivity at Federal Mill," *Pulp & Paper* 59, no. 1, (January 1985): 132-35.
2. William S. Fuller, "Chip Pile Storage—A Review of Practices to Avoid Deterioration and Economic Losses," *Tappi* 68, no. 8, (August 1985): 48-51.
3. J.V. Hatton, ed., "Chip Quality Monograph," Joint Textbook Committee of the Pulp and Paper Industry, 1979.
4. B.L. Browning, *Methods of Wood Chemistry*, (Interscience Publishers, 1967).
5. B.L. Browning, ed., *The Chemistry of Wood*, (Interscience Publishers, 1963).

EUROPE'S WASTEPAPER DEMAND

(Continued from p. 102)

back through its history and slow development. It is even more complex than the U.S. market. European consumers are mostly small mills, many with special fiber needs that are harder to fill than the standard grades that comprise the bulk of demand in the U.S.

The European market is also complicated by Europe's converting processes which result in a high contamination level of recycled paper and board. Plus, recyclable paper generators are varied, causing confusion and delayed reaction after shifts in demand, said Rose.

These complexities, however, have led some observers to dispute the relationship some claim exists between pulp and secondary fiber markets. While some feel the markets closely follow each other, Rose indicated that the European wastepaper market is more closely tied to the supply/demand balance itself.

"Of the 11 million metric tons of wastepaper consumed in the EEC in 1983, 8 to 9 million tons were not influenced by the pulp market," said Rose. "Except for the grades that are considered to be pulp substitutes, there is no relationship between the price of pulp and the price of wastepaper. The price of wastepaper is related to the price of kraft liner, semichemical fluting, newsprint, and wood."

DISPUTE OVER PULP CONNECTION. The OECD, however, notes that the price of wastepaper may rise to a level comparable with that of other fibrous raw materials used in the pulp and paper industry. In certain countries, signs of a close and stable link between high-grade wastepaper and pulp prices are already evident.

In the U.S., the consensus among paper stock merchants has been that pulp and wastepaper are closely connected. Many were blaming weak pulp markets and distressed virgin fiber prices for the downturn in the wastepaper market this year. Some recycled mills shut down their deinking systems and are using pulp.

But while the domestic market began to erode early in the year, wastepaper exports to Europe didn't begin to slow down significantly until late in the second quarter. Exports dropped sharply by 25.2% from April to May, though year-to-date figures for the first five months were still 3.4% ahead of the same period in 1984.

U.S. paper stock prices declined dramatically through the first half of the year as exports decreased. The market appeared to be leveling off in July, however.

In Europe, the market began to weaken noticeably in the second quarter. The U.K. reported consumption was up 4.5% in the first quarter compared with a year earlier, but the industry was beginning to feel a slowdown late in the second quarter. A Belgian dealer said that mills were getting more choosy about their shipments—a sign of a shift in demand.

Forecasts for the wastepaper sector in Europe for the second half of 1985 were not good, with the most optimistic calling for a supply/demand balance for the remainder of the year, according to Rose.

A downturn in the European market would reduce prospects for the U.S. wastepaper industry, yet it should not have a significant effect. Many marketing executives have already established their markets in more viable areas where long-term prospects are better. Probably, the U.S. will rely less and less on European demand. ■